
Spinal anaesthesia for laparoscopic cholecystectomy

PATIENTS AND METHODS

A descriptive prospective study was carried out between June and September 2008 in the Caribe teaching hospital in the city of Cartagena in Colombia, South America. Once the Caribe teaching hospital's medical ethics' committee's approval had been sought and given, patients were included in the study who had biliary lithiasis accompanied by a clinical picture of chronic cholecystitis as well as those having a clinical picture of subacute cholecystitis diagnosed during preoperative exam.

Patients who had been previously diagnosed as having complicated biliary lithiasis (acute cholecystitis, choledocolithiasis, acute cholangitis, acute biliary pancreatitis, etc.) were excluded. Other exclusion criteria were as follows:

- Patients aged less than 18 and older than 75;
- Patients having greater than 30 Kg/m⁻² body mass index (BMI);
- Sick patients having contraindication for laparoscopic surgery;
- Patients having contraindication for spinal anaesthesia;
- Patients who preferred general anaesthesia; and
- An inability for carrying out postoperative follow-up.

Inclusion criteria consisted of ASA I – II patients aged 18 to 75. All the patients complied with a minimum 8 hours fast; antibiotic prophylaxis was

administered 15 minutes before the procedure (1 g intravenous cephazoline)

ANAESTHETIC TECHNIQUE

A peripheral vein in the forearm was cannalized with an 18-gauge catheter. Endovenous liquid drip was begun (10 to 15 cc/kg of 0.9% SSN in bolus), as were non-invasive blood pressure monitoring (sphygmomanometer on left arm), electrocardiography (electrodes on the thorax - 5 derivatives), oximetry (finger pulse oximeter on the right arm) and capnography for measuring CO₂ in respiratory gases by nasal route. 4 mg dexamethasone was only applied for postoperative anti-nausea and vomiting therapy. Spinal anaesthesia was produced by placing the patient in a left lateral prone position; a midline puncture was performed at L2-L3 level with a 27-gauge Quincke needle, in aseptic technique. A 22.5 mg dose of bupivacaine levogira (7.5 mg/ml) was injected following the egress of clear cephalorachidian liquid. The patient was then placed in the Trendelenburg position with strict control of dermatome sensitivity. When a sensory level between T3-T4 was confirmed with cold swab, the patient was placed in a horizontal position. Oxygen was begun immediately by nasal cannula at 3.5 l/min. Heart-beat, blood pressure and arterial oxygen saturation were monitored every 2 minutes. 50mg/kg dipyrone + hyoscine bromide, 0.15 mg/kg metoclopramide, 5 mg/kg ranitidine were administered at 15-minute intervals. Atropine (0.01 mg/kg) was applied if bradycardia was detected (heart-beat lower than or equal to 50 beats/min). 2 mg ethylephrine was administered if blood pressure became reduced by 30% of base value. Midazolam (0.05 mg/kg) and phentanyl (0.5 mg/kg) were used for sedation.

The patient's definitive position was inverted Trendelenburg (30–45 degrees), involving left lateral prone position. Maximum intra-abdominal pressure level was fixed at 12 mmHg with 2 L/min CO₂ flow. Anaesthetic conversion was applied (i.e. applying general anaesthesia) if there were the presence of undesirable signs and symptoms which could not easily be managed with intravenous medication. Sensory and motor recovery, degree of pain (0 to 10 visual analogue scale), degree of satisfaction 3 hours later (excellent, good, regular, poor), a need for analgesia and the presence of undesirable events such as nausea, vomiting, restlessness, abdominal pain, pain in the shoulder (omalgia) were taken into account in the post-anaesthetic recovery room. If such symptoms were presented, they were classified (slight, moderate, severe). Patients were discharged once motor recovery, spontaneous diuresis and

tolerance to oral route had been produced and the anaesthesiologist had verified the absence of any type of complication. All patients were prescribed ibuprofen as analgesia to be taken at home (400 mgr each 8 hours for 3 days). Telephonic follow-up was carried out by a surgical team after 24 hours and followed-up by external consultation after 7 and 30 days. A person who was not part of the surgical team made a phone call on the third day to ask about the degree of satisfaction regarding the procedure (being classified as excellent, good, regular and/or poor) and to enquire whether the same anaesthetic technique would be desired if further surgery were required. Other factors which were analysed are given below:

Endogenous: age, gender, habits, weight, height and personal pathological background. Exogenous: anaesthetics used (type, dose, frequency), surgical time, anaesthetic time, cardio-respiratory monitoring, type of surgeon, required additional anaesthetic techniques, degree of pain, degree of satisfaction, surgical complications, anaesthetic complications, presentation of undesirable clinical events, conversion to general anaesthesia, required additional postoperative analgesia, length of hospital stay, time spent on daily and work activities, the value of the anaesthetic and analgesic products consumed.

Data analysis: EPI info 4.0 and Excel were used for analysing the data.

RESULTS

Forty-four patients suffering from vesicular lithiasis were surgically treated during the study period; 16 of them were submitted to emergency surgery as they had acute clinical pictures. Two patients were excluded as they were older 75 and 1 for being aged less than 18. Four patients preferred general anaesthesia. The remaining 21 patients on whom laparoscopic cholecystectomy was carried out under spinal anaesthesia formed the study population (Table 1.)

85.7% of the patients were female. Average overall age was 40.4 years (19-67). Average body mass index (BMI) was 19 Kg/m² (16-23).

90.5% of the patients were classified as being ASA I and just 2 patients were ASA II. Inguinal herniorrhaphy was performed on one patient following laparoscopic cholecystectomy. 20% of the surgeries were performed in their entirety by residents from general surgery being trained in laparoscopic surgery; they were being instructed by a laparoscopic surgeon. A vesicular cravat was diagnosed during

the intra-operative period and 2 patients presented firm adherences to the duodenum and colon. Average surgical time was 29.3 minutes (25-40). No surgical intra-operative or postoperative complications were presented. Sensory anaesthetic block level was T4 in 50%, T3 in 50%. In no case was conversion to general anaesthesia necessary.

The following undesirable events were presented during surgery (Table 2): slight anxiety in 1 patient, slight omalgia in 5 of them, slight anxiety and omalgia in 3 patients. These 9 patients were satisfactorily managed with a 1 microgram/kg phentanyl dose.

Two-thirds of the patients required a single 2 mg dose of ethylephrine and the other third 1 mg of atropine as they presented a slight tendency to hypotension and bradycardia, respectively. Carbon dioxide at the end of exhalation maintained a 34 mmHg average, with 22 per minute average respiratory frequency. Four patients required a single dose of endovenous analgesics during the immediate postoperative period, 1 patient presented acute urinary retention which required vesicle catheterisation and 1 patient presented an episode of vomiting without the need for medication. Sensory recovery was obtained after an average of 163 minutes (120-180) and motor recovery after 173 minutes (160-180). The degree of postoperative pain after 2 hours received a 1.9 (1-3) average score. The degree of satisfaction was reported as being excellent by 38% of the patients and good by 72% of them. Average hospital stay was 262.3 minutes (180-270). All patients were discharged before 4.5 hours had elapsed, except for 2 of them; associated surgery for liberating adherences has been practiced on one of them and she was discharged after 6 hours and the other was intra-operatively diagnosed as suffering from vesicular cravat, it being decided to administer endovenous antibiotic therapy for one day. A third of the patients required additional doses of oral analgesics after the third day following surgery.

The average cost of anaesthetic products for spinal anaesthesia was 15 dollars; the average cost for general anaesthesia for the same type of surgery at the same hospital is 30 dollars. 71.4% of the patients were able to carry out daily activities after the third day following their operation and the average time for becoming reincorporated into their work was 9 days (7-15). All the patients responded positively to the question, "Would you wish to be operated on again with spinal anaesthesia?"

DISCUSSION

General anaesthesia has been the anaesthetic technique of choice for most abdominal laparoscopic

procedures since its beginning and up to today. It has been described that general anaesthesia minimises the haemodynamic and respiratory consequences of pneumoperitoneum; tracheal intubation and controlled ventilation will, in turn, reduce ventilatory repercussions and the risk of regurgitation⁵. The indication of general anaesthesia in laparoscopy would seem to be an irrefutable principle, given the safety it offers. However, this technique involves greater cost than other anaesthetic techniques, postoperative pain management is more complicated, it causes a higher incidence of postoperative nausea and vomiting, needs neuromuscular block and involves low-quality reversion. Thus, as in surgery of the lower abdomen, anaesthesia with laryngeal masks is beginning to be used instead of the habitual orotracheal intubation, with encouraging results⁶.

Spinal anaesthesia for laparoscopic cholecystectomy was initially performed on patients suffering from serious obstructive pulmonary diseases⁷. Two studies have been published recently which evaluated the use of spinal anaesthesia in laparoscopic cholecystectomy on "healthy" patients and other selected cases⁸. Tzovaras *et al.*, have reported 15 patients submitted to laparoscopic cholecystectomy under spinal anaesthesia; it was possible to operate on all of them with this anaesthetic technique without the need to convert to general anaesthesia. The degree of postoperative pain during the first 24 hours was low and all (except for one patient) strongly recommended this anaesthetic technique⁷. A.A.J. Van Zundert *et al.*, have published the results from 20 patients submitted to cholecystectomy who chose the laparoscopic route; they reported that the block was effective in all cases and only 6 patients presented discomfort requiring a small dose of phentanyl. Two patients required midazolam for treating anxiety and another two required ethylephrine for managing hypotension. No patient required conversion to general anaesthesia⁷. The selection criteria for our preliminary series of 21 patients were similar to those reported in previous studies. Patients were selected with the aim of surgery being carried out rapidly and safely; the foregoing influenced the fact that the patients chosen were not elderly and did not present an important concomitant disease. However, as was expected, surgical time took a little longer as this is a teaching hospital where surgical residents are being instructed.

A significant percentage of cases required a single, low dose of ethylephrine and atropine during surgery which did not in any way interfere with its development at any time. The foregoing suggested that pneumoperitoneum must be carried out slowly to prevent vagal reflex. Carbon dioxide at the end of exhalation was monitored by nasal cannula in all

patients and it was observed that normocapnia was maintained with 18 to 22 per minute respiratory frequency, starting from 12 per minute frequencies. We attribute this finding to the self-regulation mechanism exercised by CO₂ on respiration by the respiratory centre, this being an advantage given the difficulty of ventilating these patients when they are submitted to general anaesthesia. Even though the self-regulation phenomenon is not enough for controlling hypercapnia, it is known that 15 to 30 min must elapse for PCO₂ to reach plateau conditions. The surgical procedure was carried out by surgical interns and surgical time was extremely acceptable, thereby permitting suitable PCO₂ levels. Low intra-abdominal pressure was another relevant factor, meaning that our series was actually being evaluated with arterial gases for monitoring PCO₂ in blood and correlating this with the value from monitoring gases by nasal cannula. The results have been encouraging to date. It should be stressed that the anaesthetic block was carried out in all cases by residents from anaesthesiology, being instructed by anaesthesiologists having great experience in using high blocks (mammaplasty, open cholecystectomy, etc). Sensory and motor recovery in the immediate postoperative recovery period was as expected, with low pain indices and presence

of undesirable adverse events; recovery was rapid since factors such as maintaining the same local anaesthetic dose and spinal block site determine more rapid recovery. Early discharge was achieved in nearly all most cases. For many years patients were discharged 24 hours after having been operated on; most patients are now being discharged once they have become alert, have spontaneous diuresis, tolerate a liquid diet and the surgeon has ruled out any postoperative complication (for more than 1 year now). Almost all patients are currently being discharged 4 hours after their operation (as reflected in the present series).

The costs of the anaesthetic products required for spinal anaesthesia at the hospital in question are twice as inexpensive as those required for general anaesthesia; the foregoing is mainly due to the higher cost of the inhalatory and muscular relaxants used in our setting. This preliminary series has thus shown that spinal anaesthesia could be a safe and inexpensive technique for the surgical treatment of vesicular lithiasis by laparoscopic route in selected patients, even though there is need for randomised clinical assays comparing this technique with regional and general anaesthesia in our hospitals for obtaining more conclusive data.

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